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Interface Definition Document
for the
Human Research Facility (HRF)
Foot Ground Interface (FGI)
Flight Calibration Unit (FCU)

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ACRONYMS AND ABBREVIATIONS

FCU	Flight Calibration Unit
FGI	Foot Ground Interface
HRF	Human Research Facility
IDD	Interface Definition Document
in	inch
ISS	International Space Station
P/N	Part Number
m	meter
QD	Quick Disconnect
TF-FGI	Total Force Foot Ground Interface

1.0 INTRODUCTION

1.1 PURPOSE

This Interface Definition Document (IDD) defines the interfaces provided by the Human Research Facility (HRF) Foot Ground Interface (FGI) Flight Calibration Unit (FCU), P/N SEG33110402-301.

1.2 SCOPE

The FGI FCU interfaces to be defined include: Mechanical, Electrical, Data, Audio/Video, Thermal, Vacuum and Nitrogen. No attempt has been made to define the Human Factors user interfaces or Software interfaces; those tasks are considered out of the scope of this document.

2.0 APPLICABLE DOCUMENTS

<u>Document Number</u>	<u>Rev.</u>	<u>Document Title</u>
LS-71032-3	Draft	System Requirements Document for the Human Research Facility (HRF) Foot Ground Interface (FGI) Flight Calibration Unit (FCU).
LS-71032-4	Draft	System Requirements Document for the Human Research Facility (HRF) Total Force Foot Ground Interface (TF-FGI).

3.0 HARDWARE DESCRIPTION

The FGI FCU will be used to calibrate insoles for the FGI and the Total Force Foot Ground Interface (TF-FGI) devices on the International Space Station (ISS). The insoles, which are manufactured by Novel and contain capacitive pressure transducers, are calibrated prior to experiment data collection.

The FGI FCU consists of two aluminum plates and a plumbing assembly. A neoprene rubber bladder is attached to one of the plates. During use, the insole to be calibrated will be inserted between the aluminum plates. The FGI FCU will be connected to the HRF Rack pressurized nitrogen supply via a Quick Disconnect (QD) and the metering valve will be used to control the flow of nitrogen to the bladder. The digital pressure gauge will be used to monitor the pressure exerted by the bladder on the insole. Three relief valves are included in the plumbing assembly to prevent rupture of the bladder due to over-pressurization.

The FGI FCU is shown in Figure 3-1.

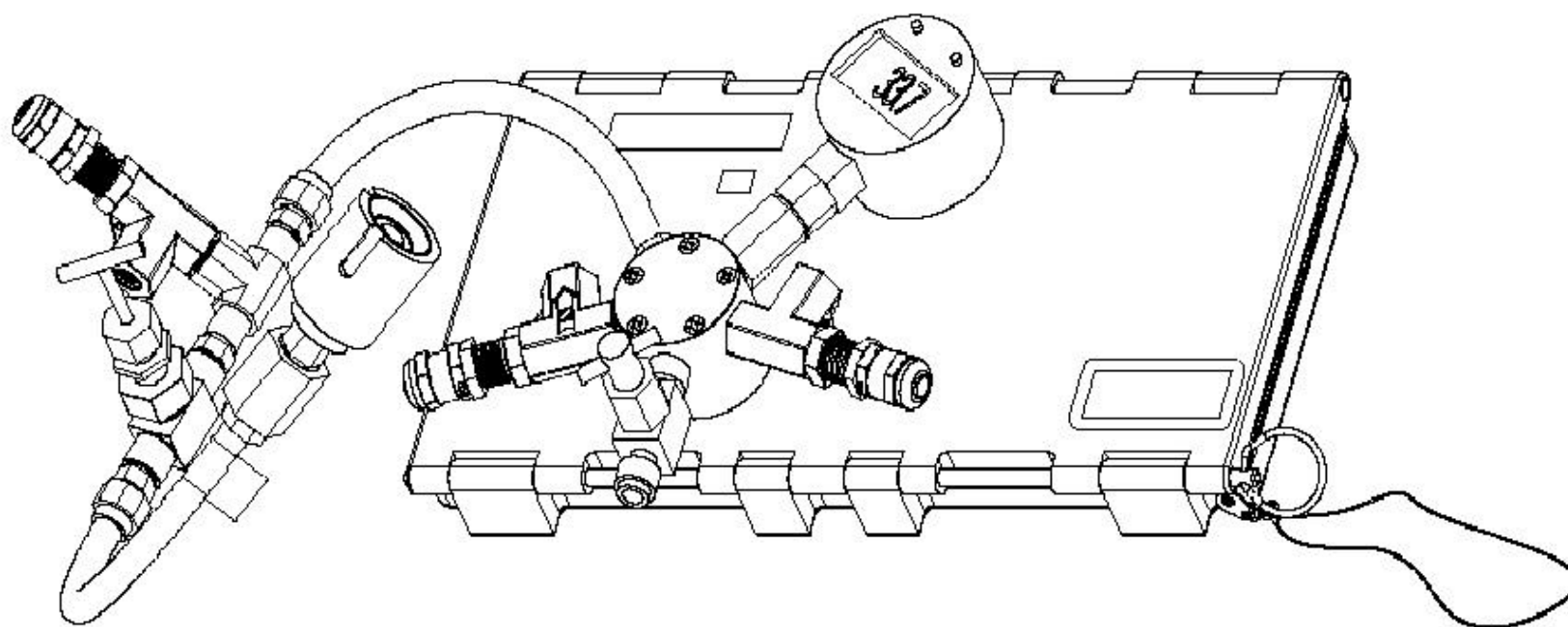


Figure 3-1. FGI Flight Calibration Unit

4.0 FOOT GROUND INTERFACE FLIGHT CALIBRATION UNIT INTERFACES

4.1 MECHANICAL INTERFACES

The FGI FCU will be stowed in a 4 PU drawer or a Middeck locker for launch and landing.

During on-orbit use the FGI FCU will be attached to the Rack seat track via an ISS Multi-use Bracket (P/N SEG33107631-301). The FGI FCU is connected to the ISS Multi-use bracket via the mounting shoe (P/N SDD33108701-003), on the lower plate of the FGI FCU assembly.

The FGI FCU interfaces mechanically with the rack nitrogen interface via a QD fitting (P/N 683-16348-353). See Section 4.7 for further information.

The FGI FCU also interfaces mechanically with the insole to be calibrated. The insole is inserted between the metal plates in the FGI FCU (see Figure 4-1). The FGI FCU is designed to accommodate one Novel insole (P/N SEG33110422-001 through -022), up to size Z (US Men 11.5 - 12.5, European 46 - 47). For calibration of items other than Novel insoles, the bladder dimensions are 0.318 m (12.5 in) long by 0.14 m (5.5 in) wide. The maximum thickness of the item being calibrated is 0.003 m (0.12 in).

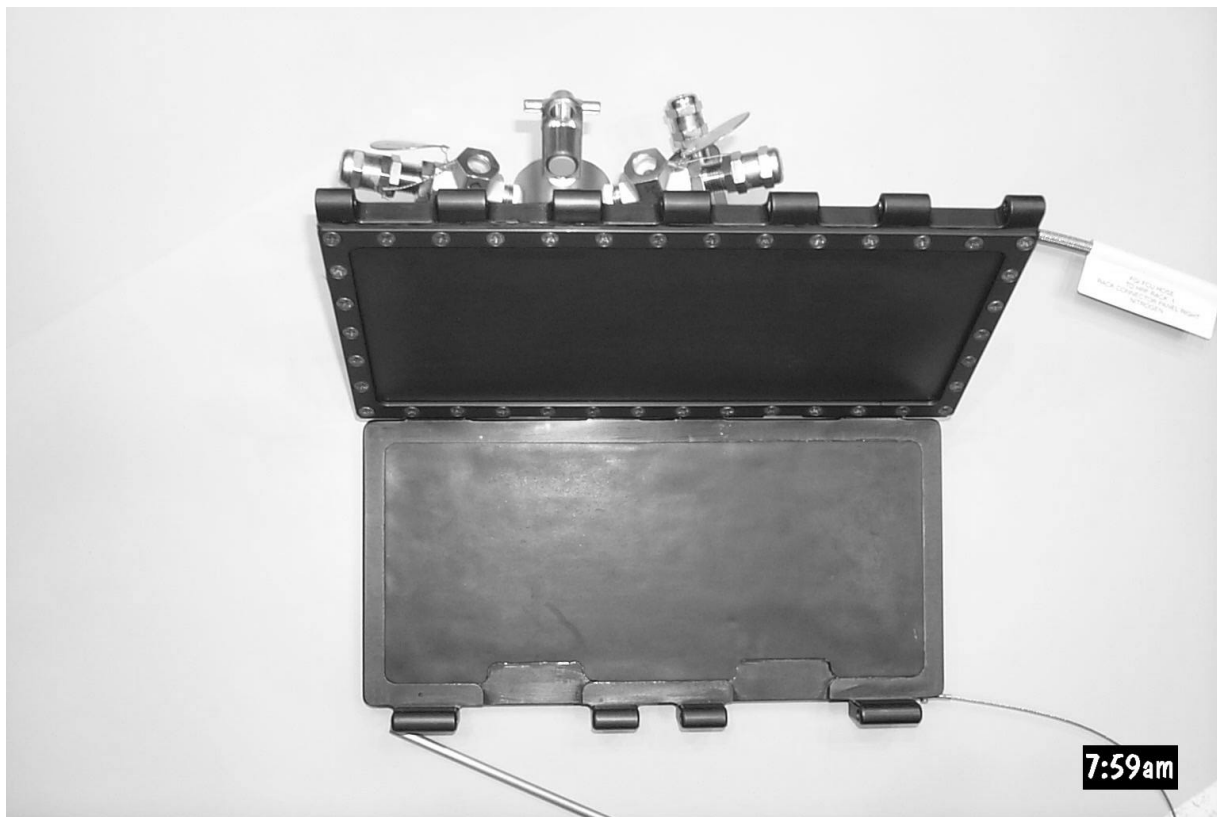


Figure 4-1. Internal View of the FGI Flight Calibration Unit

The FGI FCU digital pressure gauge is attached to the manifold via a QD, Swagelok P/N SS-QF4-B-4PF. This QD could potentially be used for installation of alternative gauges.

A schematic diagram of the FGI FCU mechanical interfaces is shown in Figure 4-2.

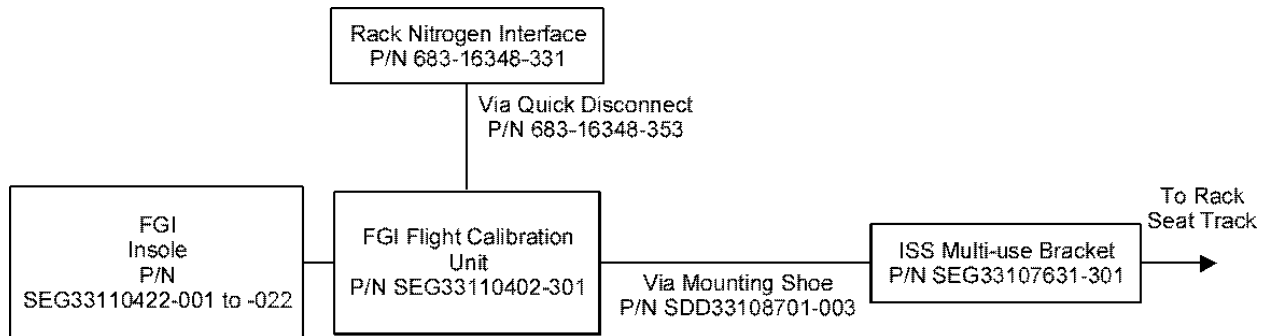


Figure 4-2. Schematic Diagram of FGI FCU Mechanical Interfaces

4.2 ELECTRICAL INTERFACES

The FGI FCU digital pressure gauge is battery powered. The hardware has no electrical power interfaces to other equipment.

4.3 DATA INTERFACES

Not Applicable. The FGI FCU has no data interfaces.

4.4 AUDIO/VIDEO INTERFACES

Not Applicable. The FGI FCU contains no audio or video interfaces.

4.5 THERMAL INTERFACES

The FGI FCU shall be cooled by convection of the cabin air.

4.6 VACUUM INTERFACES

Not Applicable. The FGI FCU has no vacuum interfaces.

4.7 NITROGEN INTERFACES

The FGI FCU interfaces to the HRF Rack 1 Nitrogen supply via a QD fitting (Parker Stratoflex P/N 505001-353, Boeing P/N 683-16348-353). This connector is a Category 8, threaded female fitting with keying B. It mates with the Rack 1 Nitrogen interface, P/N 683-16348-331 which is a male Category 8 fitting with keying B. Following calibration, nitrogen from the FGI FCU bladder is vented to the cabin, via a Nupro plug valve, P/N SS-4P4T5-M2.

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